Pre-Test Unit 5: Solving Equations KEY

No calculator necessary. Please do not use a calculator.

Solve the following equations for the given variable. There may be a single solution, infinite solutions, or no solutions. *(5 pts; 2 pts for simplification, 2 pts for inverse operation, 1 pt for answer)*

1. $7g + 3g - 10 + 3 = 43$

$g = 5$

2. $4(x + 2) - \frac{1}{2}x = 22$

3. $6y + 9 - 7 = 4y + 12$

$y = 5$

4. $6(b + 2) = 6b + 13$

5. $6y + 9 - \frac{4}{3}y = 4y + \frac{2}{3}y + 12$

no solution

6. $6(b + 2) = 6b + 12$

Write and solve an equation for the following situations. *(5 pts; 2 pts for correct equation, 2 pts for correct simplification and inverse operations, 1 pt for answer)*

7. A man buys four books from the store and a Preferred Reader discount card for $\$20$. Later that day, he goes back and buys five more books. He also got a $\$5$ discount using his new card. If he spent a total of $\$87$ at the bookstore, how much did each book cost assuming every book cost the same amount?

$$4b + 20 + 5b - 5 = 87$$
$$b = 8$$

8. A girl bought two packs of gum from the store. Later she thought she would need some more gum and went back to the store to buy three more packs of gum. If she paid a total of $\$5.70$ for gum, how much was each pack of gum?

9. A store discounted the price of Doritos $\$0.35$ and then a man bought 5 bags. If he paid a total of $\$12.70$ for the bags of chips, how much was each bag originally?

$$5(d - 0.35) = 12.70$$
$$d = 2.89$$

10. A man bought 4 cups of coffee and left a $\$7$ tip. A woman bought 8 cups of coffee and only left a $\$2$ tip. If they paid the same amount, how much was each cup of coffee?

Answer the following questions about creating equations. *(5 pts; partial credit at teacher discretion)*

11. Create and solve a multi-step equation with exactly one solution.

Answers will vary

12. How would you know that your equation has exactly one solution without actually solving it?

13. Create and solve a multi-step equation with no solutions.

Answers will vary

14. How would you know that your equation has no solutions without actually solving it?

15. Create and solve a multi-step equation with infinite solutions.

Answers will vary

16. How would you know that your equation has infinite solutions without actually solving it?

Solve the following equations. *(5 pts; 2 pts for correct inverse operation, 3 pts for answer or answers)*

17. $x^2 = 64$

$x = \pm 8$

18. $x^2 = -16$

19. $x^3 = 64$

$x = 4$

20. $x^3 = -27$

Unit 5 Homework Key

Lesson 5.0

Solve each equation using inverse operations.

1. $2x + 4 = 8$ $x = 2$

2. $\frac{x}{2} - 5 = -9$

3. $-x = 15$ $x = -15$

4. $x - 4 = 8$

5. $\frac{x+5}{4} = -2$ $x = -13$

6. $-3x - 5 = -2$

7. $3(x - 2) = 6$ $x = 4$

8. $\frac{x}{3} = -3$

9. $\frac{x}{2} + 9 = 10$ $x = 2$

10. $\frac{x-7}{3} = -5$

11. $x + 7 = -3$ $x = -10$

12. $2(x + 4) = -10$

13. $x - 4 = -9$ $x = -5$

14. $\frac{x}{5} + 1 = 2$

15. $\frac{x}{6} = 0$ $x = 0$

16. $-3(x - 12) = 15$

17. $\frac{x-8}{3} = -6$ $x = -10$

18. $x + 7 = 2$

19. $\frac{x}{7} - 3 = -1$ $x = 14$

20. $4x = 18$

21. $-(x + 4) = 8$ $x = -12$

22. $4x + 1 = 9$

23. $-5x - 2 = 8$ $x = -2$

24. $\frac{x+6}{3} = 7$

25. $x - 750 = 200$ $x = 950$

26. $7x + 4 = -10$

27. $-9x = 27$ $x = -3$

28. $x + 8 = 4$

29. $6(x - 3) = 0$ $x = 3$

30. $-x - 9 = 3$

31. $3(x + 9) = 36$ $x = 3$

32. $\frac{x}{10} = 2$

33. $\frac{x}{5} + 3 = -2$ $x = -25$

34. $\frac{x+3}{8} = -1$

35. $\frac{x-6}{2} = 3$ $x = 12$

36. $\frac{x}{2} - 1 = 0$

Lesson 5.1

Solve each equation by combining like terms when necessary.

1. $2x + 3 = 23$ $x = 10$

2. $-7y + 2 = 16$

3. $\frac{q}{3} + 7 = 12$ $q = 15$

4. $\frac{z+3}{4} = 5$

5. $2g + 2g - 4 + 3 = 43$ $g = 11$

6. $4 + 3h - h = 2 + 10$

7. $2t + 8 + \frac{1}{2}t - t = 11$ $t = 2$

8. $4a + 6a + 3 - 8 = 15$

9. $3w + 15 - 5 + 2w = 5$ $w = -1$

10. $\frac{5}{2}r + 2r + 7 - 2 = 5$

11. $2y + 2y + 6 + 10 = 18$ $y = \frac{1}{2}$

12. $5x + 7 - 2x + 1 = 12$

13. $3 - 2x + 4x + 6 = 9$ $x = 0$

14. $10 - 5 + 3x + 2x = 0$

Write an equation for each situation and then solve by combining like terms when necessary.

15. Great Uncle Wilbert splits his inheritance equally between his five nieces and nephews. Unfortunately each of them must pay a $\$7500$ inheritance fee to the state government. If each niece or nephew got $\$237{,}500$, how much money was Great Uncle Wilbert's inheritance worth? $\$1{,}225{,}000$

16. The Department of Designing the Death Star had a lot of money in a bank account and then received a large donation of $\$13{,}000$ from George Lucas. They decided to split their money equally between the three research projects: Tie Fighters, Mega Lasers, and Air Conditioning/Power Grid. If each research project got $\$25{,}000$, how much money did the Department of Designing the Death Star have in the bank account originally?

17. Logan collected pledges for the charity walk-a-thon. He will receive total contributions of $68 plus $20 for every mile that he walks. How many miles will he need to walk to raise $348? $14\ miles$

18. Jasmine bought 6 CDs, all at the same price. The tax on her purchase was $5.04, and the total was $85.74. What was the price of each CD?

19. A farmer buys 6 sheep to start his wool farm. He then decides to buy insurance for $100 just in case something baaaa…d happens. The farmer realizes that his six sheep just aren't enough and decides to buy 10 more sheep. He also thought the sheep would sleep better at night if he bought them a small space heater for $25. If the farmer paid a total of $925, how much did each sheep cost? $50

20. Nikki buys 7 packs of SillyBanz from the store. After school the next day, she decides to buy 3 more packs to give to her friend Olivia. Then she realized that if she didn't buy something for Kerrie too, Kerrie would be mad. So Nikki then went back to the store again and bought 2 more packs of SillyBanz to give to Kerrie. If Nikki spent a total of $14.40, how much was each pack of SillyBanz?

21. During the spring car wash, the Activities Club washed 14 fewer cars than during the summer car wash. They washed a total of 96 cars during both car washes. How many cars did they wash during the summer car wash?
$55\ cars$

22. The Marsh family took a vacation to Disney World that covered a total distance of 1356 miles. (That includes the trip there and the trip back.) The trip back was 284 miles shorter than the trip there. How long was the trip to Disney World (meaning the trip there)?

Lesson 5.2

Solve each equation by using the distributive property and combining like terms.

1. $2(x+7)+x=20$ $x=2$

2. $2(x-1)+3x=3$

3. $3(m+1)-2m=0$ $m=-3$

4. $z+4(2z+3)=15$

5. $-\frac{1}{2}(b+2)+3b=-1$ $b=0$

6. $4(n+2)-2n=0$

7. $4+2(1+x)=12$ $x=3$

8. $-(x+3)+\frac{3}{4}x+5=0$

9. $2(2x+3)-2=5$ $x=\frac{1}{4}$

10. $2(3x-1)+2(4x+5)=8$

Write an equation for each situation and then solve by using the distributive property and combining like terms.

11. A gym charges a $\$50$ activation fee and $\$17$ per month for a membership. If you spend $\$356$, for how many months do you have a gym membership? $18\ months$

12. Suppose you go to a concert and purchase 3 identical T-shirts and a hat. The hat cost $\$21$ and you spend $\$60$ in all. How much does each T-shirt cost?

13. A store had homemade sweaters on sale for $\$20$ off the original price. Aunt Ethel jumped at the bargain and bought a sweater for all 15 members of her family. If Aunt Ethel paid $\$375$ for all the sweaters, what was the original price of each sweater? $\$45$

14. After an oil pipeline burst one morning, gas prices went up by $\$2.20$ per gallon. If that afternoon you bought 10 gallons of gas for $\$53.90$, what was the price per gallon before the oil pipeline burst that morning?

15. For Christmas, Maryland purchased subscriptions to Xbox Live for her four children. Each subscription costs $\$5$ per month plus a $\$15$ sign-up fee. If she received a bill for $\$120$, for how many months did she purchase subscriptions for her children? $3\ months$

16. When Apple sells their iPads, they increase the price $\$50$ from what it costs them to actually make the iPads. One Apple store sold 10 iPads one day which cost a total of $\$5000$. How much does an iPad cost to actually make?

Lesson 5.3

Solve each equation by using the distributive property, combining like terms, and eliminating the variable on one side of the equation.

1. $2y + 3 + 4 = 5y + 10$ $y = -1$

2. $2p + 4p - 3 = 2p + 1$

3. $8k + 5 + 2k = 23 + k$ $k = 2$

4. $4r + \frac{9}{4}r + 14 = 5r - \frac{3}{4}r + 1 - 3$

5. $2x + 3 = 2x - (3 + 2x) + 6$ $x = 0$

6. $4(x - 1) + 2x = 2(x + 2)$

7. $-5(f + 2) = 3f + 2$ $f = \frac{-3}{2}$

8. $\frac{3}{2}c - 3c + 4 = \frac{5}{2}c + 7 - 3$

9. $10(a + 1) = 2(a + 2) - 2$ $a = -1$

10. $5x - 3x + 7 = 3x - 1$

11. $5d - 25 + 2d = 2d$ $d = 5$

12. $4(2t + 1) + t = 3(t + 2)$

13. $\frac{1}{2}q + 2(q + 5) = -4(q + 1) + 1$ $q = -2$

14. $4(1 - 2u) = 2(u + 2)$

15. $5z - z + 3 = z + 3 + 1$ $z = \frac{1}{3}$

16. $6x - 3x + 26 = 5(x + 8)$

17. $6(x + 1) = 4\left(1 + \frac{1}{4}x\right) + 6 + 3x$ $x = 2$

18. $9m - m + 3 = -2(m + 1)$

19. $-(y - 4) + 3y = 4(y + 1)$ $y = 0$

20. $-2(j + 5) + 6 = 4(j + 2)$

Write an equation for each situation and then solve by using the distributive property, combining like terms, and eliminating the variable on one side of the equation.

21. Tao is making a 7 feet high door. If the height is 1 foot more than twice its width, what is its width?

$3\ feet$

22. Terikka bought three bags of popcorn at the concession and a drink for $\$1.50$. If she paid $\$3.75$ total, how much was each bag of popcorn?

23. Naphtali's cell phone company charges $\$0.25$ per text plus a $\$10$ flat fee. Asher's cell phone company charges $\$0.10$ per text plus a $\$25$ flat fee. At how many texts are Naphtali and Asher paying exactly the same amount?

$100\ texts$

24. Stanley bought five packs of Yu-Gi-Oh cards, $\$7$ worth of bubble gum, and then eight more packs of Yu-Gi-Oh cards. Simon bought four packs of Yu-Gi-Oh cards, $\$10$ worth of Cheetos, $\$12$ worth of Mt. Dew, and then six more packs of Yu-Gi-Oh cards. If they paid the same amount, how much was each pack of Yu-Gi-Oh cards?

25. Toby sells his framed paintings for $\$20$ each. Ishmael sells his paintings for $\$14$ each and charges a flat fee of $\$18$ for framing. How many paintings need to be purchased for Toby and Ishmael to charge the same amount?

$3\ paintings$

26. The original price of Doritos is the same at both Wal-Mart and County Market. Jon found out that Wal-Mart had Doritos on sale at $\$0.50$ off per bag and bought four bags. Later that day, he found out that County Market had Doritos on sale at $\$1$ off per bag and bought six bags. If he paid the same amount at both stores, what was the original price of Doritos?

Lesson 5.4

Solve the following equations. Some equations will have a single answer, others will have no solution, and still others will have infinite solutions.

1. $2x + 2x + 2 = 4x + 2$
   infinite solutions

2. $3(x - 1) = 2x + 9$

3. $2x + 8 = 2(x + 4)$
   infinite solutions

4. $2x - x + 7 = x + 3 + 4$

5. $-2(x + 1) = -2x + 5$
   no solution

6. $4x + 2x + 2 = 3x - 7$

7. $2(x + 2) + 3x = 2(x + 1) + 1$
   $x = \frac{-1}{3}$

8. $4(x - 1) = \frac{1}{2}(x - 8)$

9. $x + 2x + 7 = 3x - 7$
   no solution

10. $3x - x + 4 = 4(2x - 1)$

11. $4(2x + 1) = 5x + 3x + 9$
    no solution

12. $10 + x = 5(\frac{1}{5}x + 2)$

13. $8(x + 2) = 2x + 16$
    $x = 0$

14. $3 + \frac{3}{2}x + 4 = 4x - \frac{5}{2}x$

15. $\frac{3}{2}(2x + 6) = 3x + 9$
    infinite solutions

16. $\frac{1}{2}(2 - 4x) + 2x = 13$

17. $12 + 2x - x = 9x + 6$
    $x = \frac{3}{4}$

18. $4x + 1 = 2(2x + 3)$

19. $4(x + 3) - 4 = 8\left(\frac{1}{2}x + 1\right)$
    infinite solutions

20. $x + 5x + 4 = 3(2x - 1)$

21. $5(x + 2) - 3x = 2(x + 5)$
    infinite solutions

22. $3x + 1 = 3(x - 1) + 4$

23. $4x + 2x - 5 = 7x - 1$
    $x = -4$

24. $-2(x + 1) = 2(x - 1)$

25. $2(x + 5) = 2x + 5$
    no solution

26. $2(3x + 3) = 3(2x + 2)$

27. $2x + 1 - 4 = -2x - 3$
    $x = 0$

28. $4(x + 1) = 4(2 - x)$

29. $3x + 7x + 1 = 2(5x + 1)$
    no solution

30. $6(x + 1) + 5 = 13 - 2 + 6x$

Create multi-step equations with the given number of solutions.
All answers will vary.

31. A single solution

32. Infinite solutions

33. No solution

34. Infinite solutions

35. No solution

36. A single solution

37. No solution

38. A single solution

39. Infinite solutions

40. A single solution

41. Infinite solutions

42. No solution

Lesson 5.5

Solve.

1. $x^2 = 100$

$x = \pm 10$

2. $x^2 = 196$

3. $x^2 = 25$

$x = \pm 5$

4. $x^2 = 1$

5. $x^2 = 81$

$x = \pm 9$

6. $x^3 = 1$

7. $x^3 = 64$

$x = 4$

8. $x^3 = -27$

9. $x^3 = -64$

$x = -4$

10. $x^3 = -1$

11. $x^2 = \frac{25}{36}$

$x = \pm \frac{5}{6}$

12. $x^2 = \frac{49}{16}$

13. $x^2 = \frac{64}{81}$

$x = \pm \frac{8}{9}$

14. $x^3 = -\frac{27}{64}$

15. $x^3 = \frac{1}{8}$

$x = \frac{1}{2}$

16. $x^2 = 64$

17. $x^2 = 49$

$x = \pm 7$

18. $x^2 = 144$

19. $x^3 = -8$

$x = -2$

20. $x^3 = 1000$

21. $x^3 = -125$

$x = -5$

22. $x^2 = \frac{100}{121}$

23. $x^2 = \frac{4}{36}$

$x = \pm \frac{1}{3}$

24. $x^3 = \frac{1}{125}$

25. $x^3 = 0.125$

$x = \frac{1}{2}$

26. $x^2 + 25 = 50$

27. $x^2 - 25 = 0$

$x = \pm 5$

28. $x^2 - 16 = 10$

29. $x^2 + 13 = 36$

$x \approx \pm 4.8$

30. $x^2 = 200$

31. $x^3 + 5 = 13$

$x = 2$

32. $x^3 + 1 = 28$

33. $x^3 - 2 = 62$

$x = 4$

34. $x^3 - 10 = 115$

35. $x^3 = \frac{8}{27}$

$x = \frac{2}{3}$

Review Unit 5: Equations KEY

No calculator necessary. Please do not use a calculator.

Unit 5 Goals

- *Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. (8.EE.7a)*
- *Solve linear equations with rational number coefficients, including equations that require using the distributive property and combining like terms. (8.EE.7b)*
- *Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. (8.EE.2)*

Solve the following equations for the given variable, state that there are infinite solutions, or state that there are no solutions.

1. $2x + \frac{5}{2}x - 8 + 2 = 3$

$x = 2$

2. $3(m + 4) - 2m = 9$

3. $3(2y + 5) - 6 = 4y + 10$

$y = 0.5$

4. $2(b + 2) = \frac{2}{3}(b + 6)$

5. $5g + 6 - 2 = 4g + 4 + g$

infinite solutions

6. $4y + 9 - y = 3(y + 3)$

7. $5x - (x + 2) = 4x + 8$

no solution

8. $2 + 4j - 5 = 10j$

Write and solve an equation for the following situations.

9. Soda is on sale for $\$0.20$ off each 12-pack. A man bought 4 12-packs and paid a total of $\$4.20$. How much did each 12-pack originally cost?

$$4(p - 0.20) = 4.20$$
$$p = \$1.25$$

10. A local baseball team bought 75 shirts from a t-shirt company. The team was charged $\$6.25$ for total shipping but received a $\$20$ team discount. If the total bill was $\$398.75$, how much was each t-shirt?

11. A boy buys four video games from the store and a Frequent Gamer discount card for $\$10$. Later that day, he goes back and buys two more video games. He also got a $\$2$ discount using his new card. If he spent a total of $\$218$ at the game store, how much did each video game cost assuming every video game cost the same amount?

$$4g + 10 + 2g - 2 = 218$$
$$g = \$35$$

12. Verizon Wireless offers an internet plan for $\$20$ a month plus a $\$20$ setup fee. Consolidated Communications offers an internet plan for $\$25$ a month plus a $\$10$ setup fee. After how many months will the plans be equal?

Answer the following questions about creating equations.

13. Create and solve a multi-step equation with infinite solutions.
Answers will vary.

14. How would you know that your equation has exactly one solution without actually solving it?

15. Create and solve a multi-step equation with no solutions.
Answers will vary.

16. How would you know that your equation has no solutions without actually solving it?

17. Create and solve a multi-step equation with exactly one solution.
Answers will vary.

18. How would you know that your equation has infinite solutions without actually solving it?

Solve the following equations.

19. $x^3 = 8$
$x = 2$

20. $x^2 = 25$

21. $x^2 = -36$
no solution

22. $x^3 = -64$

23. $x^3 = -125$
$x = -5$

24. $x^2 = 4$